FIG. 3 is a block diagram illustrating a typical configuration of the base station and the mobile terminal in FIG. 2. In the diagram, reference sign 14 denotes a transmission power control unit; 15, a base station transmission/reception antenna; 16, a mobile terminal transmission/reception antenna; 21, a transmitter for channel 1; 22, a transmitter for channel 2; 23; a multiplexer; 24, a separator; 25, a receiver for channel 1; 26, a receiver for channel 2; 27, a mobile terminal receiver; 28, a receiving condition detector; 29, a mobile terminal transmitter; C1, a transmission power control signal for channel 1; C2, a transmission power control signal for channel 2, P1, a transmission power instruction signal for channel 1; and P2, a transmission power instruction signal for channel 2. The transmission power control unit 14 may be a computer including a CPU, a memory and the like, and its operation is realized by a computer program.

The base station in this embodiment has a maximum of N radio channels. The base station transmits signals of speech, data or the like over one or more of these N radio channels. When carrying out transmission, it performs transmission power control and multiplexes the channels to transmit signals via its antenna.

The operation of transmission power control unit 14 will now be described with reference to the flow chart of FIG. 4. The transmission power control unit 14, at step 301, receives channel receiver transmission power instruction signals C1, C2, . . . , CN containing requests from mobile terminals regarding how much its transmission power level should be raised or lowered. Then, at step 302, information on the levels of transmission power at which transmission should take place on the different channels, i.e. the provisional values for transmission power control signals P1, P2, . . . , PN, are calculated and provisionally determined. If, for instance the content of the transmission power control signal C1 is a request to raise the transmission power of the transmitter for channel 1 by 1 dB, the provisionally determined value P1 for the channel 1 transmission power control signal P1 will be made 1 dB higher than the current level of transmission power of channel 1.

Then, at step 303, it is checked whether or not the values P1, P2, . . . , PN provisionally determined at step 302 are within the transmission power ranges of the respective channels, and those above the upper limit of the range are changed to the upper limit while those below the lower limit are changed to the lower limit (step 304).

Next, the sum of the values P1, P2, . . . , PN provisionally determined at either step 303 or step 304 is calculated, and checked whether or not the sum surpasses a prescribed value X (step 305). If it does, the values P1, P2, . . . , PN will be corrected at step 306.

If, for instance, the sum of the transmission power levels from channels 1 through N surpasses the prescribed value X, either the provisional values of all the channels from 1 through N, or those of only the channels relatively high in transmission power level, are reduced by 1 dB each, or the provisionally determined values are changed to lower levels in proportion to the initial provisional values.

The prescribed value X may be determined according to the size of the base station's cell and the number of mobile terminals among other factors. This prescribed value X may further be made variable according to the state of interference.

At step 307, the transmission power control signals P1, P2, . . . , PN determined as described above are supplied to the transmitters for the respective channels. The transceiver for each channel transmits signals of speech, data or the like to be transmitted at the level of transmission power conforming to the applicable one of the transmission power control signals P1, P2, . . . , PN. The multiplexer 23 multiplexes the signals from the different channels, and transmits them by electric wave from the base station's transmission/reception antenna 15.

The electro-magnetic wave emitted from the base station's transmission/reception antenna 15 is received by the receiver 27 of one or another of the mobile terminals via its transmission/reception antenna 16. The receiving condition detector 28 monitors the conditions of receive power and detected signals at the receiver 27, and generates a signal to instruct the base station's transmission power to be raised or lowered according to one or more of SIR, post-detection bit error rate and frame error rate.

For example, thresholds A, B and C (A>B>C) are set, and a signal is generated which instructs to lower the transmission power of the base station by 1.0 dB if SIR surpasses A, to reduce it by 0.5 dB if the SIR surpasses B but not A, to raise it by 0.5 dB if SIR surpasses C but not B, or to raise it by 1.0 dB if SIR fails to surpass C.

This signal is transmitted, either incorporated into the main signals or over another special independent channel, from the transmitter 29 of the mobile terminal to the base station. At the base station, the separator 24 separates the signals channel by channel, and the receiver 25 separates these signals to make them transmission power instructing signals C1, C2, . . . , CN.

The invention serves to prevent the transmission power of the transmitter from rising too high, and makes communication possible at the lowest necessary transmission power level, resulting in compression of the interference range.

What is claimed is:

1. A base station for use in a mobile communication system in which a base station and a plurality of mobile terminals communicate with each other over preset communication channels and the transmission power on each channel is controlled on the basis of a transmission power instruction signal transmitted from each of said plurality of mobile terminals, comprising:

a plurality of base station side transceivers, one provided for each of said channels, each receiving signals from a corresponding mobile terminal, separating said transmission power instruction signal from receive signals, amplifying the signals to be transmitted to the mobile terminal of the corresponding channel at a level of transmission power designated by the transmission power control signal, and transmitting these signals to the corresponding mobile terminal, and

a transmission power control unit which is supplied with transmission power instruction signals separated by said plurality of base station side transceivers, provisionally determines the transmission power levels of said plurality of transceivers on the basis of these transmission power instruction signals, corrects the provisionally determined transmission power levels according to the sum of the provisionally determined transmission power levels, and supplies values indicating the corrected transmission power levels to said plurality of base station side transceivers as said transmission power control signals.

2. A base station for use in a mobile communication system, as claimed in claim 1, wherein said transmission power control unit, if said sum surpasses a predetermined value, corrects the provisionally determined transmission power value of any of said plurality of channels which is